Coccolith Concentration

Product Description

This Level 2 and 3 product provides five parameters describing the concentration of coccoliths in sea water. Parameter 2577 is the detached coccolith concentration in number/m^3 and Parameter 5355 is the estimated calcite concentration due to the coccoliths in mg-$CaCO_3/m^3$. The pigment concentration in the coccolithophore biomass is Parameter 5356; Parameter 5357 is a descriptor for the particular look-up table used, and Parameter 5358 is a quality measure. The product is produced a 1 km and 20-km spatial resolution daily for Level 2 and 3 and weekly at Level 3.

Research & Applications

Coccolithophores are small marine phytoplankton which form external calcium carbonate ($CaCO_3$) scales having diameters of a few μm and a thickness of 250 to 750 nm called coccoliths. Coccolithophores are the largest source of calcium carbonate on Earth. Thus, coccolith production is an important part of the biogenic carbon cycle. The observed characteristics of coccolithophores, including their ubiquitous nature, possible role in climate, and intense scattering property, make a global-scale study of their distribution an important application for MODIS imagery. Specifically, it is important to estimate the rate at which $CaCO_3$ is formed by phytoplankton and to look for long-term changes in that rate.

Data Set Evolution

The algorithm for extracting the detached coccolith concentration from surface waters is based on the semianalytic model of ocean color of Gordon (1988). The model relates the normalized water-leaving radiance to the absorption and scattering properties of the constituents of the water using radiative transfer theory. The absorption and scattering properties are then related to the constituent concentrations through statistical analysis of direct measurements. The model is validated by comparison with a set of water-leaving radiances independent of the measurements used to establish the statistical relationships between constituents and optical properties.

Suggested Reading

Balch, W.M., *et al.*, 1991.

Gordon, H.R., *et al.*, 1988.

Groom, S.B. and P.M. Holligan, 1987.

Holligan, P.M., *et al.*, 1983.

Sarmiento, J.L., *et al.*, 1988.

Sikes, S. and V. Fabry, 1994.

MOD 25
PRODUCT SUMMARY

Coverage:
global ocean surface, clear-sky only

Spatial/Temporal Characteristics:
1 km, 20 km/daily, weekly

Key Science Applications:
input to global biogeochemical cycle models

Key Geophysical Parameters:
coccolith and calcite concentration, pigment concentration in coccolithophore blooms

Processing Level:
2, 3

Product Type:
standard, at-launch

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